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Manure Management

Michigan State University Extension Service

Animal Agriculture Initiative

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1998

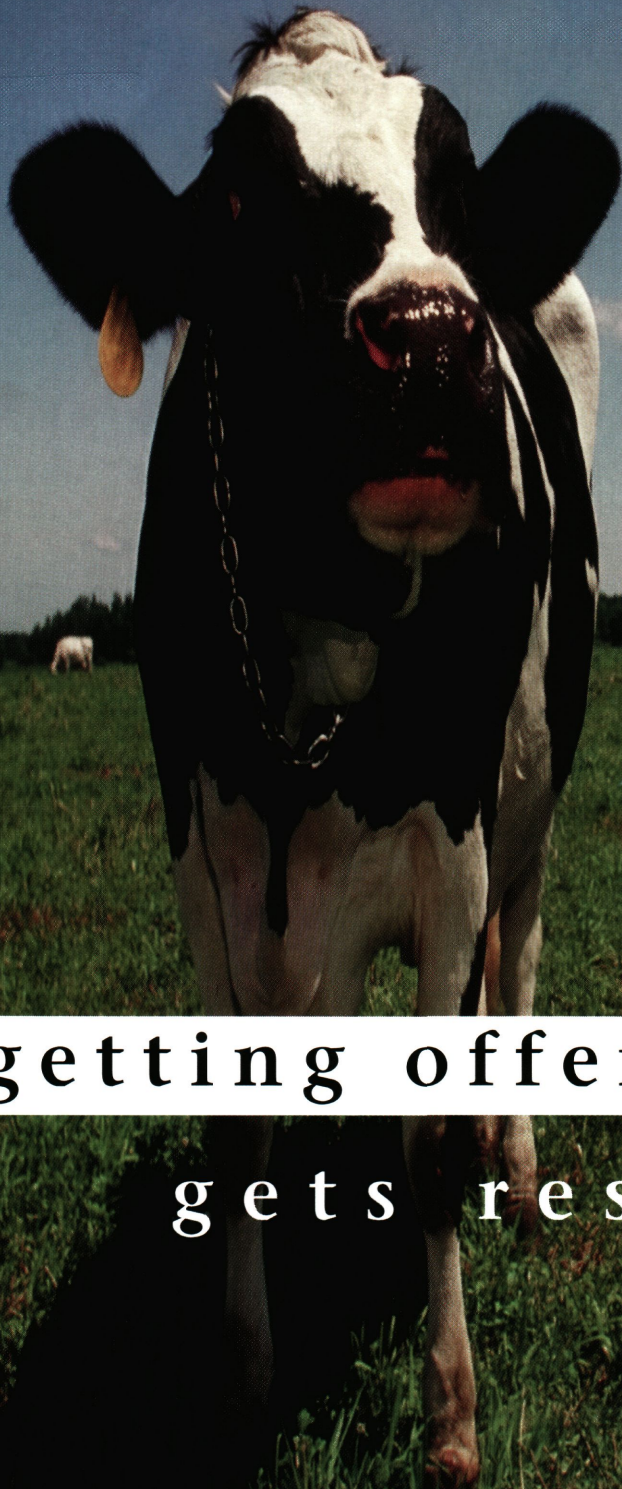
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michigan animal

agriculture initiative



getting offensive

gets results

manure management

**Manure Management.** Now there's a topic. It would be funny, if it weren't so valuable. Try joking about **\$14 billion.** That's the annual income of the agriculture industry in the State of Michigan. Every county in the state--every resident in each county--benefits from that \$14 billion. **Big time!**



# Got your interest? Good. Read on....

22,000 new jobs

Ask any member of the agriculture industry, from the farmers to the food processors, and he or she will tell you the single biggest problem thwarting that industry is, you guessed it, manure management.



**The stuff is everywhere.** Managing it involves complex economic, scientific, environmental and social issues. It's no laughing matter.

Convinced of the industry's growth potential (approximately \$1 billion in additional annual revenues; 22,000 new jobs), the **Michigan Legislature** launched the Animal Agriculture Initiative in 1993. It was a **two-year, \$74.6 million, bi-**

industry wide growth  
**partisan program** to advance the research and upgrade the facilities that support the state's second largest industry.

Initiative in 1993. It was a **two-year, \$74.6 million, bi-**

Which brings us to the point of this brochure. A critical component of the Animal Agriculture Initiative is the **Manure Management Project**. That makes sense: dollars and cents. For the biggest impediment to industry-wide growth is the absence of a pro-active, statewide manure management program.



The project, funded at **\$200,000 per year** for two years—1994-1996—has enabled the **best minds** already involved in manure-related problem-solving to coordinate and accelerate their efforts. It represents your tax dollars at work—important, **dirty work**.

What follows is a report on the success of that work. Fifteen projects, each representing a critical issue of manure management—odor containment, ground water protection, product transportation, new market potential—and **15 practical solutions**. Solutions that both enhance economic growth and safeguard the state's precious natural resources.

Keep reading.... This is your pocketbook;

**your quality of life.**



careful  
management



# 15 Projects: 15 Practical Solutions

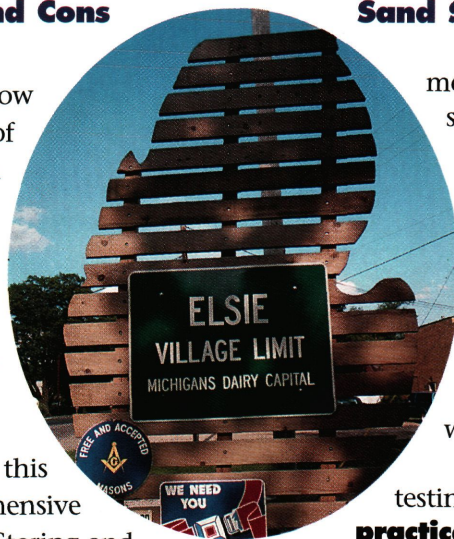
## Bedding Down: The Pros and Cons of Sand for Dairy Cows

Your typical 1,400-pound dairy cow produces more than **115 pounds** of manure a day. If that cow sleeps on sand, which is the bedding of choice in terms of cow comfort and cleanliness, that number rises, due to the addition of the sand, to more than 165-pounds a day. Every day. For every cow.

### So **what is a farmer to do?**

Two projects focus specifically on this issue. The first resulted in a comprehensive yet concise handbook for farmers, "Storing and Handling Sand-Laden Dairy Manure:" A Description of **Manageable Practices** on Midwest Farms.

This Michigan State University Extension Bulletin (E- 2561/April 1995) analyzes the **benefits of sand bedding** and offers a practical comparison of handling systems, storage needs and equipment. For your copy, contact the MSU Extension Bulletin Office at (517) 355-0240.



## Sand Separation Made Easy

The second project explores methods for separating the bedding sand from the manure prior to storage. This **new approach** is desirable for two reasons: 1) the life of manure spreading equipment is significantly longer if sand--a natural abrasive--is not part of the manure mix; and 2) the mechanical removal of the manure from storage is easier for the farmer if it is not weighed down with sand.

Researchers have devised and are testing a system for separation that is **practical, environmentally friendly and appropriate** for use on individual farms.

The system draws upon concepts originally developed for use in washing sand and gravel and removing grit at sewage treatment plants. First, the manure is diluted with water. Then, the water is aerated to cause rapid bubbling. This separates the sand from the manure. The sand sinks to the bottom of the cleaning chamber and is trapped for removal and later use. **Even the water** used in the dilution process may be recycled!

# balancing the elements

## In Harmony: A New Model for Dairy/Crop Farming

In theory, a dairy farm should be able to operate as a **self-sustaining entity**: the producer grows the feed that supports the herd that in turn produces the milk for sale as well as the new offspring. The reality, as most farmers know, proves different.

Using process network theory and multi-criteria optimizations—two scholarly, mathematical techniques—researchers have developed a **new model** for dairy farming. The model balances six types of crop production with soil profile, commercial fertilizer application, surface run-off, dairy herd, feed supplements, feed ration formulation and manure handling, storing, and spreading.

What results is a computer program that guarantees nutrient balance while minimizing both the area needed for manure disposal and the feed costs. The program also determines the appropriate amount of crops to grow and sets feed rations.



## Taking the Stink Out of the Swine

When Shakespeare wrote: "The rankest compound of villainous smell that ever offended nostril," he wasn't referring to swine manure. But he may as well have been. **Swine manure stinks.** There is universal agreement on that. Annihilating those odors is no easy task. But project researchers have **proven** that it can be done.

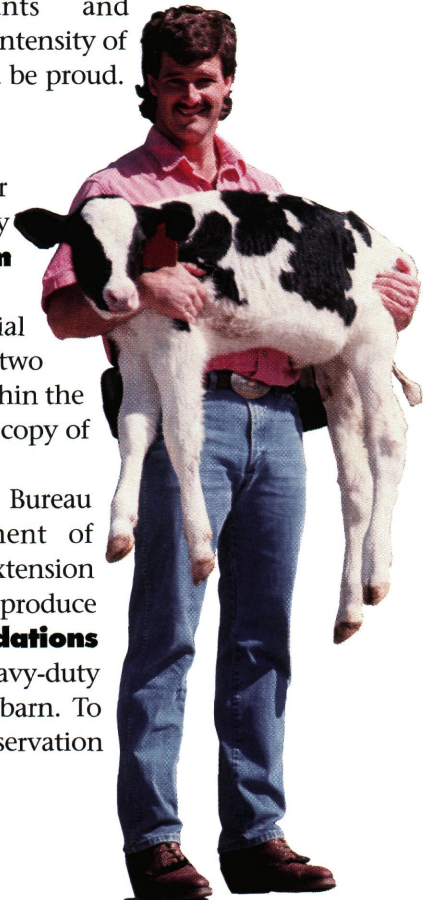
Using an innovative process of infusing swine manure with **ozone**--a form of oxygen that naturally occurs in the upper atmosphere and is made and used commercially in disinfectants and deodorizers—they have profoundly reduced that noxious smell. Regardless of the intensity of the odor—be it from fresh or stored manure—ozone works. The **Old Bard** would be proud.

## Farming In The Know

Critical to the overall success of the Manure Management Project is a clear understanding of its starting point. To quantifiably establish this baseline, a survey was conducted to assess farmers' knowledge of **Michigan's Right to Farm Act**.

This legislation outlines generally accepted agricultural and managerial practices for manure. The survey yielded a wealth of information including two striking facts: While 80 percent of farmers knew they were required to operate within the guidelines of the Right to Farm Act, 75 percent had never received or reviewed a copy of the act.

To remedy the discrepancy, Michigan Farm Bureau teamed up with Farm Bureau Insurance, the Michigan Department of Agriculture and the Department of Environmental Quality, Michigan State University Extension and the Natural Resources Conservation Service to write, produce and distribute 10,000 copies of **"Basic Recommendations for Livestock Manure Management"**, a heavy-duty plastic information card suitable for hanging in one's barn. To obtain a copy, contact your local Natural Resources Conservation Service office or MSU Extension office.





**Chemistry Out On The Farm.** Phosphorus is a nonmetallic element of the nitrogen family. Crop and livestock farmers spend a considerable amount of **time and money** monitoring and managing the amounts of phosphorus and nitrogen found in their soil.

Too much causes one set of problems. Too little causes another. Either way, farmers know phosphorus or nitrogen problems threaten the vitality of their animals, their crops and the surrounding environment.

This is a particularly tricky issue for turkey farmers who must give their birds phosphorus supplements in order to facilitate their **growth and development**. But, if too much is given, high concentrations are found in the turkey litter. If too little is given, production suffers.

Researchers have determined through feeding experiments not only the minimum amount of phosphorus required for **healthy growth** but also the appropriate ratio of phosphorus to phosphatase, an enzyme that facilitates usage of phosphorus.

This is **win-win research**: It saves the turkey farmer time and money. More importantly, it makes environmental protection a lot easier.

# good news

## More Good News About Phosphorus

It is now easier for swine farmers to use their manure solids as fertilizer without risking the addition of too much phosphorus to their soil.

Studies show that 90 percent of the phosphorus found in swine waste is held in manure solids or feces. The remainder is found in the urine. Typically, however, it has been the liquid—the urine or the water added to facilitate handling—that has limited transportation and spreading of manure solids on crop lands. It is the liquid (the substance that actually

contains very little phosphorus) that, when mixed with the solids, **triggers the problem.** What results is an environmental hazard: Too much phosphorous-rich manure in too little an area.

To separate manure solids from liquids and facilitate the appropriate, controlled use of manure as fertilizer, agricultural engineers and animal scientists have designed and tested **an innovative flooring** for swine facilities. The flooring is slotted and underlain with a slanted surface that drains and catches waste liquids. The manure solids remain on the floor for easy removal and use as fertilizer.



controlled use



## Turkey Litter Proves Valuable

Each year, Michigan's turkey industry produces approximately five million birds. This is good. Each year, those same turkeys produce about **300,000 tons of litter.** This is not good.

The turkey industry wants to double its operation to 10 million birds. Limiting this expansion is the problem of disposal of the litter.

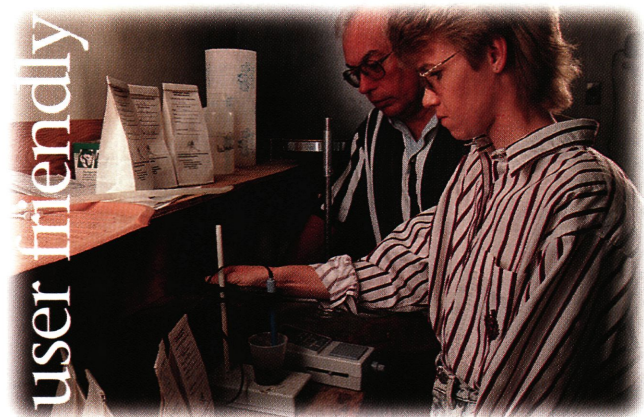
Researchers have developed and tested an ingenious method for handling turkey litter, making it a **nutritious alternative feed** for beef cattle. The method enables turkey producers to not only expand their industry but also realize additional

profits from the sale of the litter. At the same time, it helps **resolve an environmental issue** that can not be ignored.

## High-Tech Nutrient Management

Researchers have developed a user-friendly computer program—**MSU Nutrient Management**—to assist farmers in establishing and maintaining an effective manure nutrient management system.

These systems are essential to the prevention of surface and ground water pollution, just one of the many hazards of unchecked manure application. The program has been tested by a variety of users across the state, and it has just been updated to include the latest findings. MSU Nutrient Management software version 1.3 (CP036-3) is available through the MSU Extension Bulletin Office. Call (517) 355-0240.



user friendly





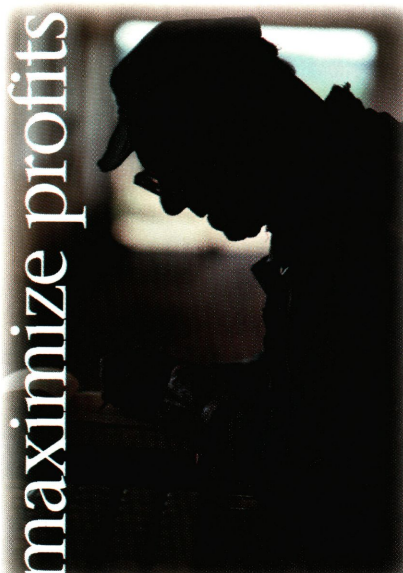
### Plants Can Be a Player, Too

Can certain foliage serve as an effective combatant against runoff from open feedlots and livestock facilities? **The answer is yes.** Researchers, in partnership with the Natural Resources Conservation Service, studied the situation as it occurs in Northern climates.

They found that select plants or "filter strips," as the foliage is called, do significantly **reduce the flow of nutrient liquids**—most notably phosphorus—and solids from animal feedlots. Standards have been set regarding the best kinds of plants to be used, the appropriate quantities and maintenance for optimal results. Information is available through your local Natural Resources Conservation Service office.



functional foliage



maximize profits

### Maximizing Profits through Design

Proper facility design is an integral part of any business operation. In livestock farming, it is **essential.** Yet, in Michigan, these services are not readily available.

To fill this void, researchers have partnered with government agencies, agribusiness and farm organizations to develop specific, detailed plans that **maximize farm efficiency and economic return** by providing a quality animal environment and preventing pollution (through manure management systems) while enhancing overall operations.

**The next step?** The partnership will encourage and assist private sector consultants as they establish, develop and make available these services.



## Composting, A Viable Alternative

No odor, no flies. Sounds pretty good when you're talking about manure.

Composting as a manure management alternative has proven to be **successful in long-term tests** on six dairy farms in Ionia County. Odor was eliminated, fly populations were nonexistent and both volume and weight of the manure was reduced by at least 50 percent.

The system uses municipal yard waste and traditional farm bedding—straw and sawdust—as its carbon source, thereby creating new uses for two common waste

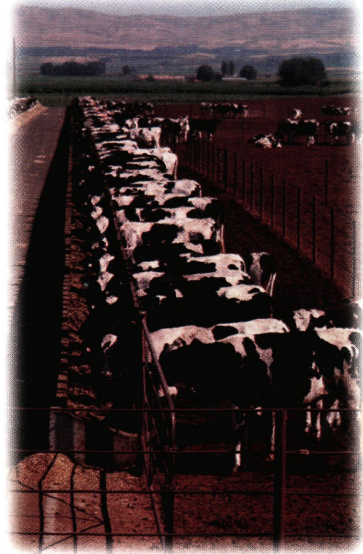
products. The video tape, "**On-Farm Composting as a Manure Management Method**" is available for loan through the Agricultural Extension and Education Resource Center. Call (517) 353-3175.

## Buying, Selling and Trading Manure

Yes, there is a market. Yes, upstanding individuals will pay good **money for manure**. Setting up the store, so to speak, is the challenge.

Huron County farmers were surveyed to see who had extra manure and how much, and **who might want more**. Times studies were conducted to determine approximate loading, hauling and application costs. Based on transportation costs and nutrient content, maximum, cost-effective hauling distances were established.

With this information, a commercial enterprise was established to broker and haul manure and... you guessed it... **business is booming!**



## Where Is The Manure, Exactly?

Another team of researchers estimated, county by county, the types and amounts of manure available in the state by verifying the animal densities in each county.

Data from the 1994 Michigan Agricultural Statistics and the 1992 Census of Agriculture were used along with information supplied by Consumers Power Company.

**The team** also calculated the nutrient content of the manure by species and by county to determine the type, quantity and quality of resources available. The bottom line? Most counties do not have too much manure.

get inside



## Task Force Fosters Communication

To your average citizen, manure is manure: A simple, if smelly, subject.

To your average farmer, food processor or university researcher, however, manure is an **extremely complex matter**. So complex—given the number of species involved and the myriad relationships and interrelationships between the various livestock and the environment—farmers, food processors and researchers can get caught up in their particular areas of interest and loose sight of **the big picture**.

The Manure Management Task Force keeps the big picture in focus, tracking new information and making it readily available to **all members of the agriculture community**. To promote dissemination of this information, it launched what has become an annual event, the Michigan State University Manure Management Conference, and, in cooperation with the Thumb Area Water Quality Initiative, has produced a Manure Management Resource Notebook. **For more information** on the conference or the resource book, contact Dr. Howard Person at (517) 353-4619 or Dr. Lee Jacobs at (517) 353-7273.

partnership



This, it is now safe to conclude: **Getting offensive gets results.** When you are talking about manure management, that is. A united Michigan Legislature, driven by the state's agriculture industry, took the offensive and, **we're pleased to report,** is getting results. Results that promise to pay-off. **Big time.**

# Michigan residents

## Who stands to gain? The list is long.

Dairy, beef, sheep, swine and poultry livestock farmers certainly will gain. As will livestock feed producers. Equine operators—those involved in horse racing and recreational riding—**will benefit** also, as will the processors of meat, eggs, cheese, oil and leather goods.



They, however, are not alone. **Environmentalists, city planners** and Michigan residents from the Porcupine Mountains to Detroit, and every place in between, will too.

Funding of the Manure Management project via the Michigan Animal Agriculture Initiative, fueled a fast, concentrated research and development effort. Work, **already underway** at Michigan State University, was coordinated and accelerated to produce **creative solutions**. Solutions to the biggest barrier to environmentally sound economic growth in the agriculture industry: Manure.

As you can see from the variety and complexity of projects, manure management is not simple. Nor is it singular. Ongoing success requires an ongoing commitment. A \$14 billion industry, with an estimated **30 percent growth** potential, beckons.

The Manure Management Project was possible because manure-related research was already in progress. **No one started from scratch**. Researchers simply sped up the process. Speeding up the process costs money. Thanks to the Michigan Legislature, that process got a two-year, \$400,000 jump start. **The momentum is set**. It must be sustained.

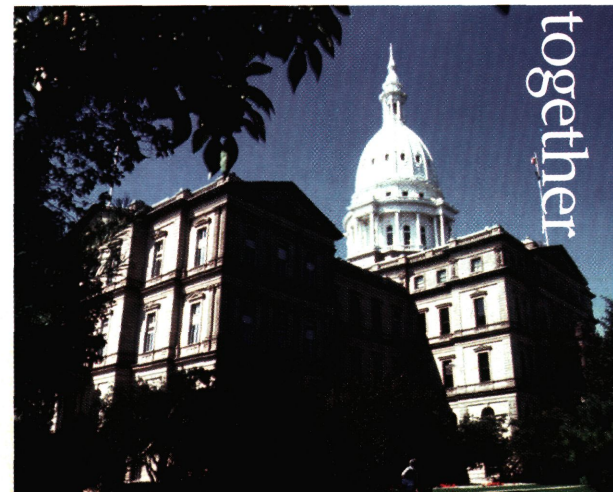


Getting offensive gets results.

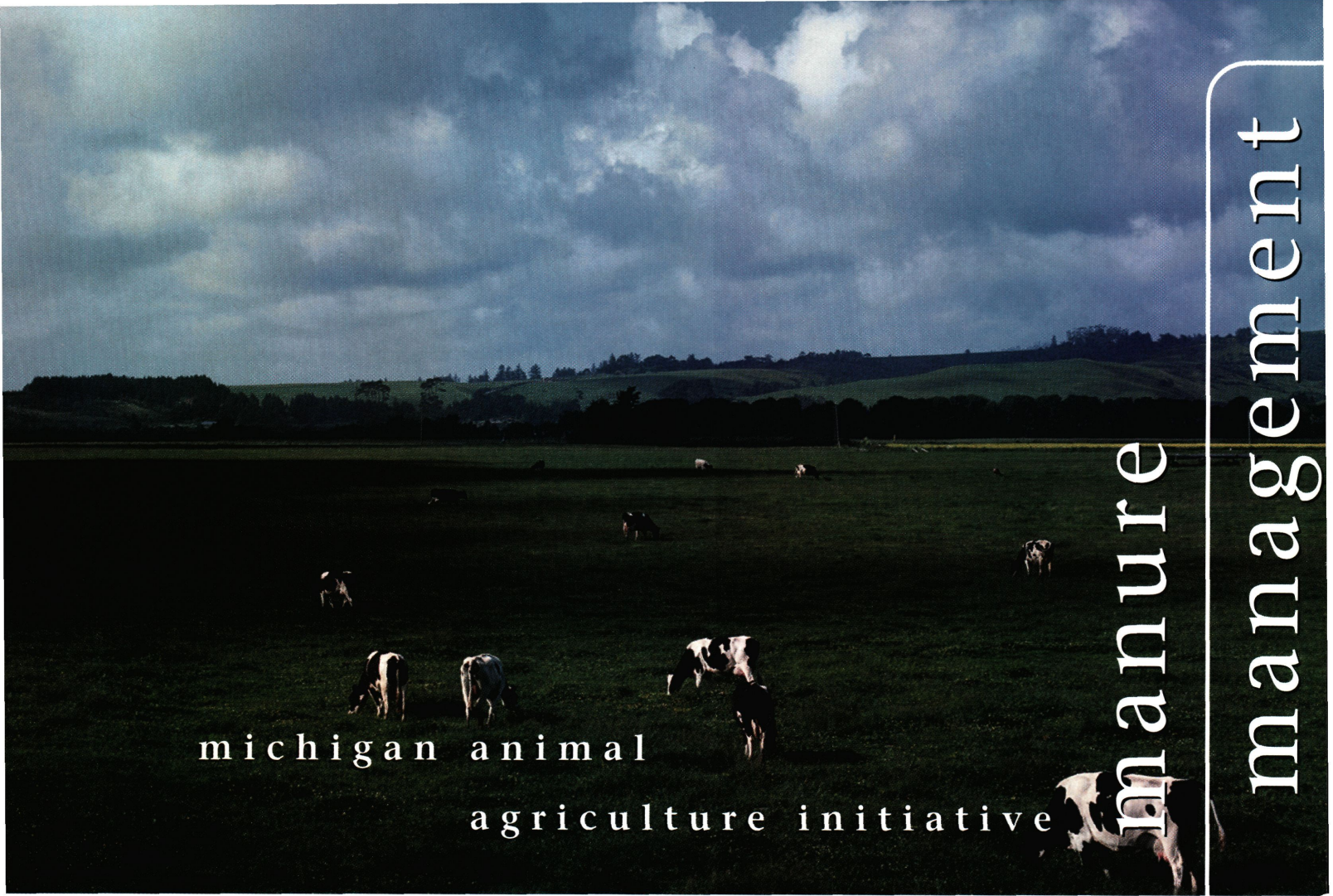
Staying offensive guarantees them.



A \$14 billion  
dollar industry,  
with an estimated  
30 percent growth  
potential, beckons.



working  
together



michigan animal

agriculture initiative

manure  
management

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